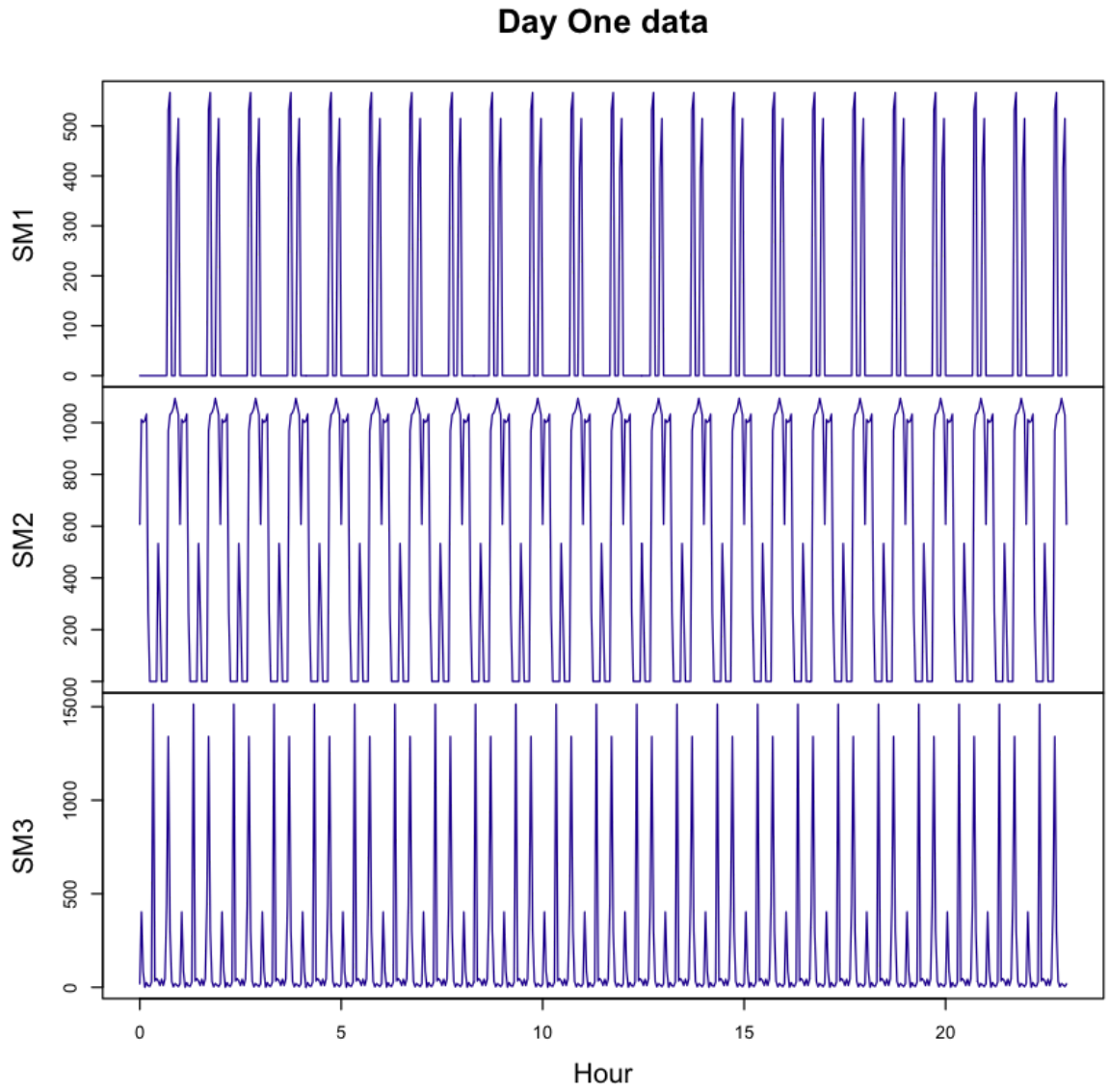
Time Series Forecasting using HoltWinters and Decompose

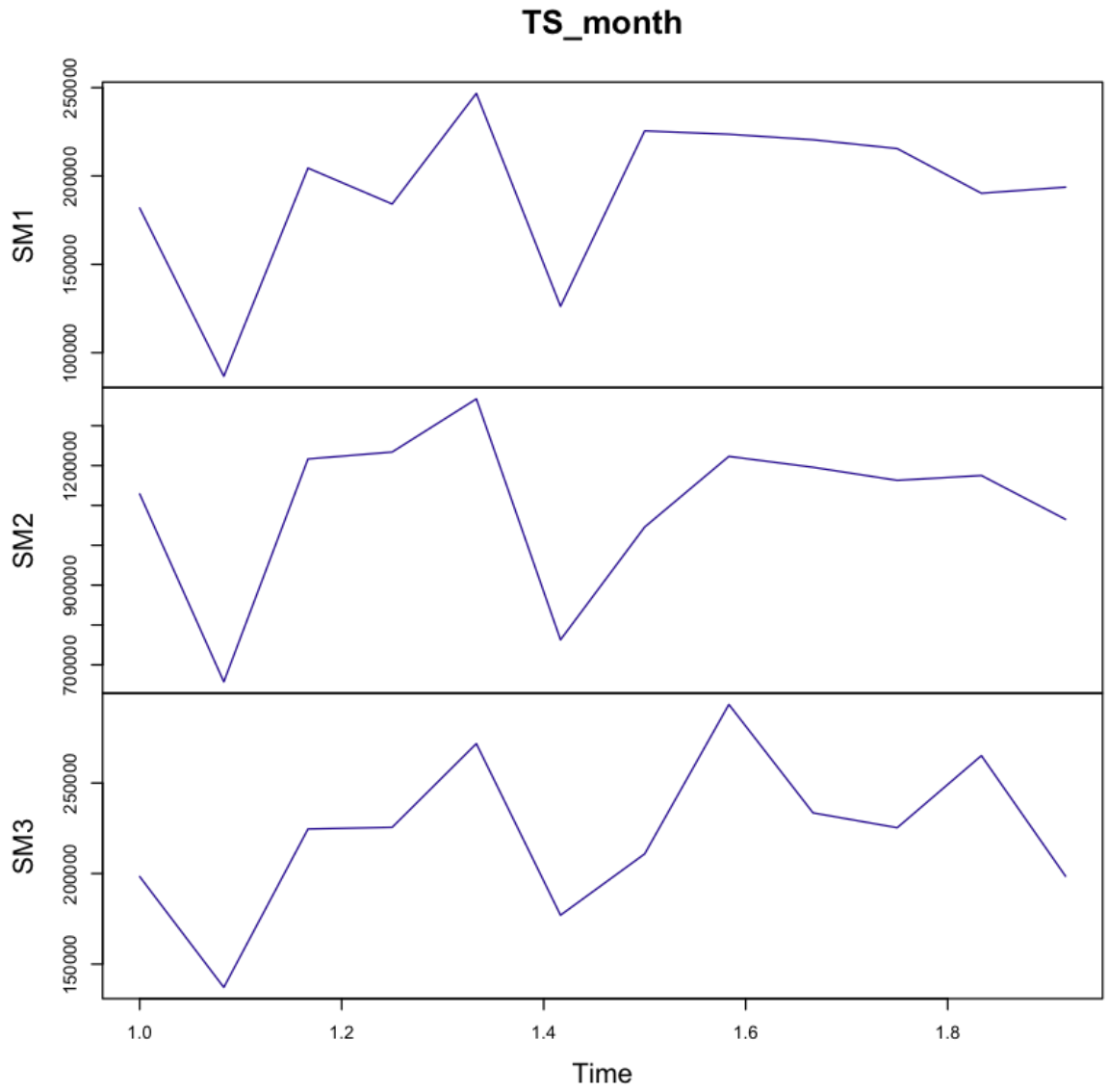
Day One data

In [13]:
```
plot(TS_day, xlab="Hour", ylab="Consumption", main="Day One data", type="l",
col="darkblue")
```



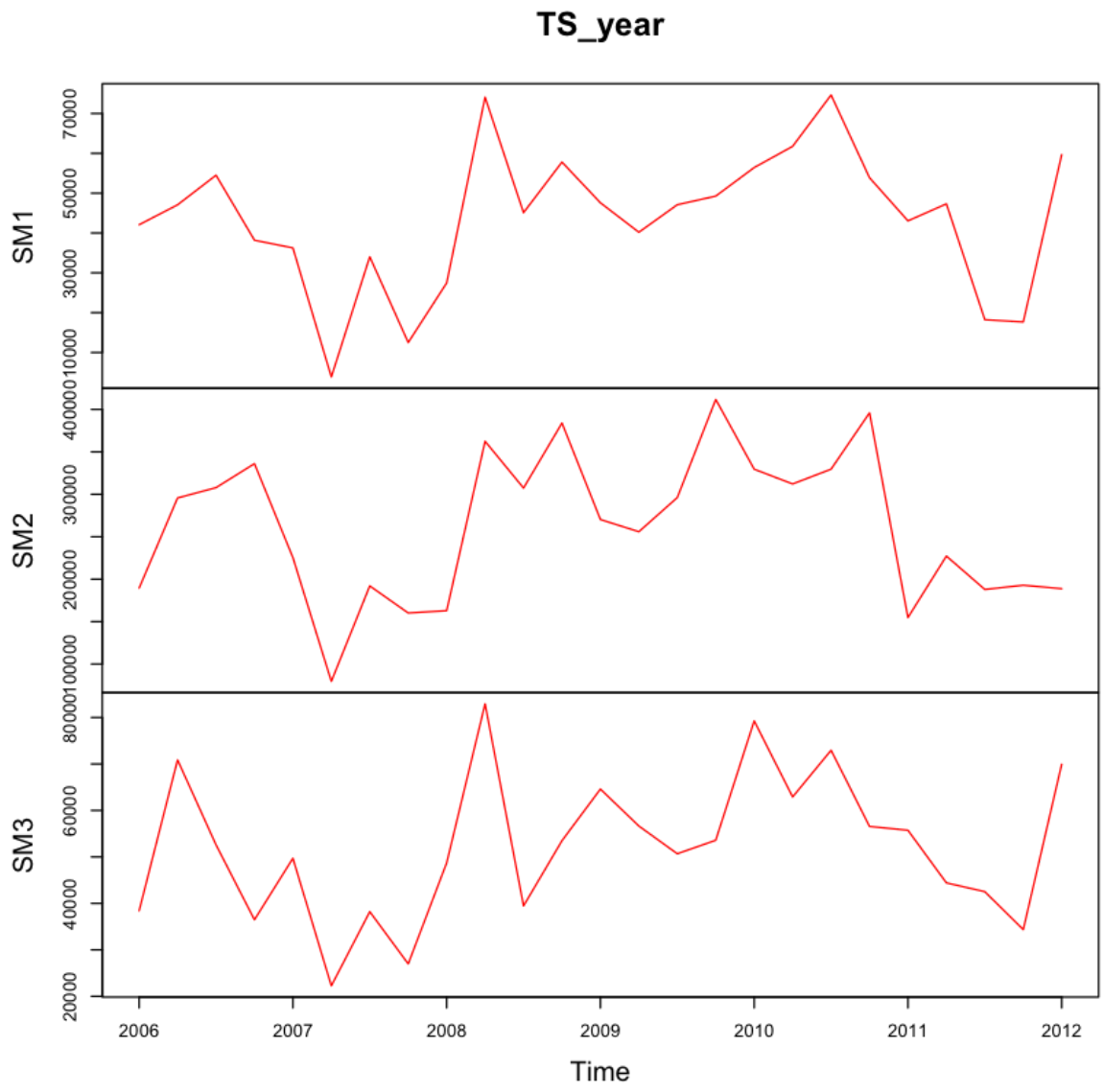
Monthly Aggregate data from 2006 Dec to 2011 Nov

In [15]:
```
plot(TS_month, col="darkblue")
```



Yearly Data

In [17]:
```
plot(TS_year, col=rainbow(10))
```



Based on the above graph, we can see that the power consumption was highest for all

three meters in year 2008, so we will break down to quarterly data for year 2008

In [23]:

```
par(mfcol=c(2,2))
ts.plot(TS_2008_Q1, plot.type="s", main="Q1 data", gpars= list(col=rainbow(10)))
ts.plot(TS_2008_Q2, plot.type="s", main="Q2 data", gpars= list(col=rainbow(10)))
ts.plot(TS_2008_Q3, plot.type="s", main="Q3 data", gpars= list(col=rainbow(10)))
ts.plot(TS_2008_Q4, plot.type="s", main="Q4 data", gpars= list(col=rainbow(10)))
```

```
Warning message in xy.coords(x = matrix(rep.int(tx, k), ncol = k), y = x, log
= log):
“NAs introduced by coercion”Warning message in xy.coords(x, y):
“NAs introduced by coercion”Warning message in xy.coords(x = matrix(rep.int(t
x, k), ncol = k), y = x, log = log):
“NAs introduced by coercion”Warning message in xy.coords(x, y):
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x, k), ncol = k), y = x, log = log):
“NAs introduced by coercion”Warning message in xy.coords(x, y):
“NAs introduced by coercion”
```
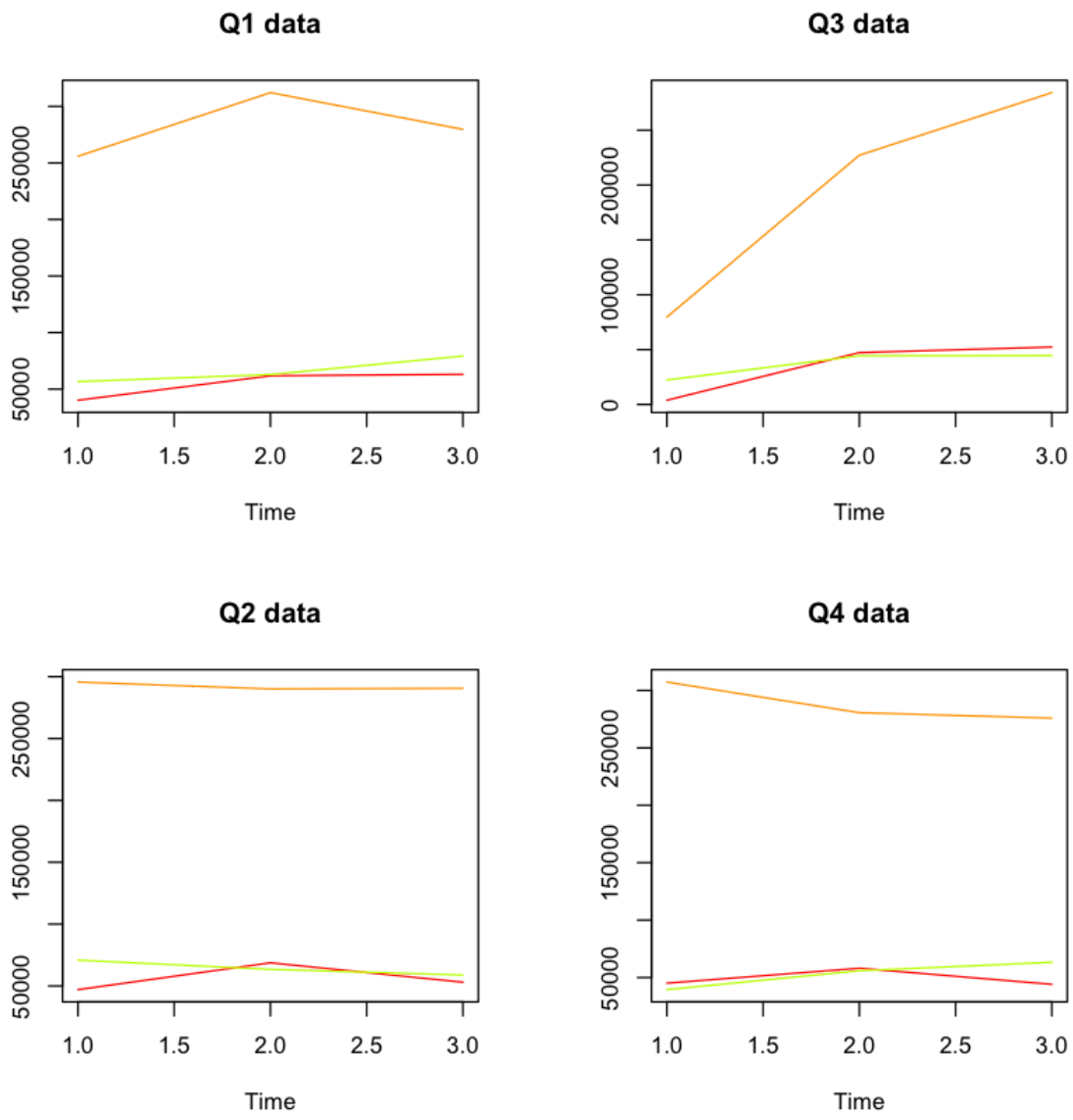
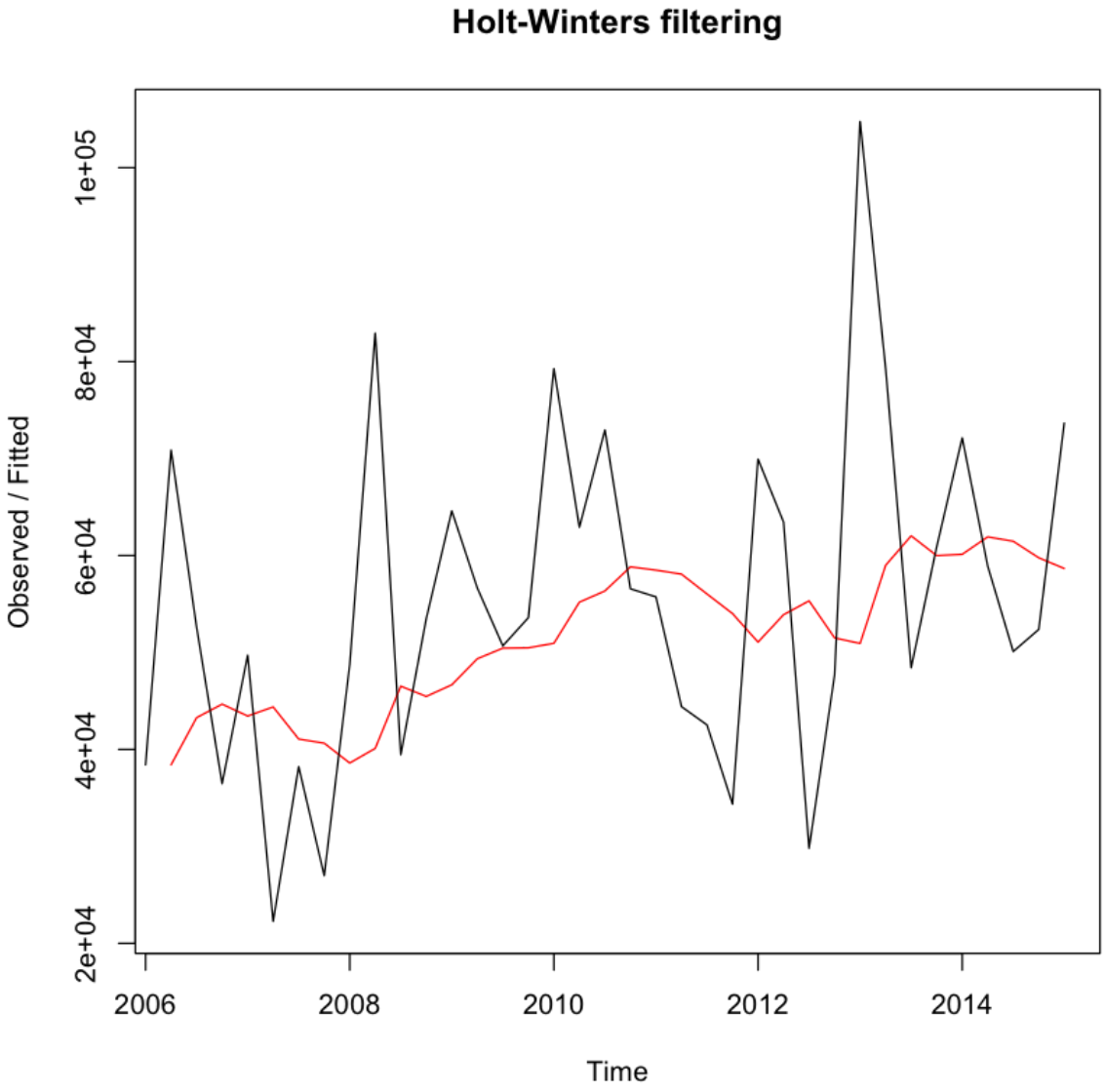



Holt winters for year 2006-2012 for SM1(Sub meter 1) and projected quarterly demand until 2015

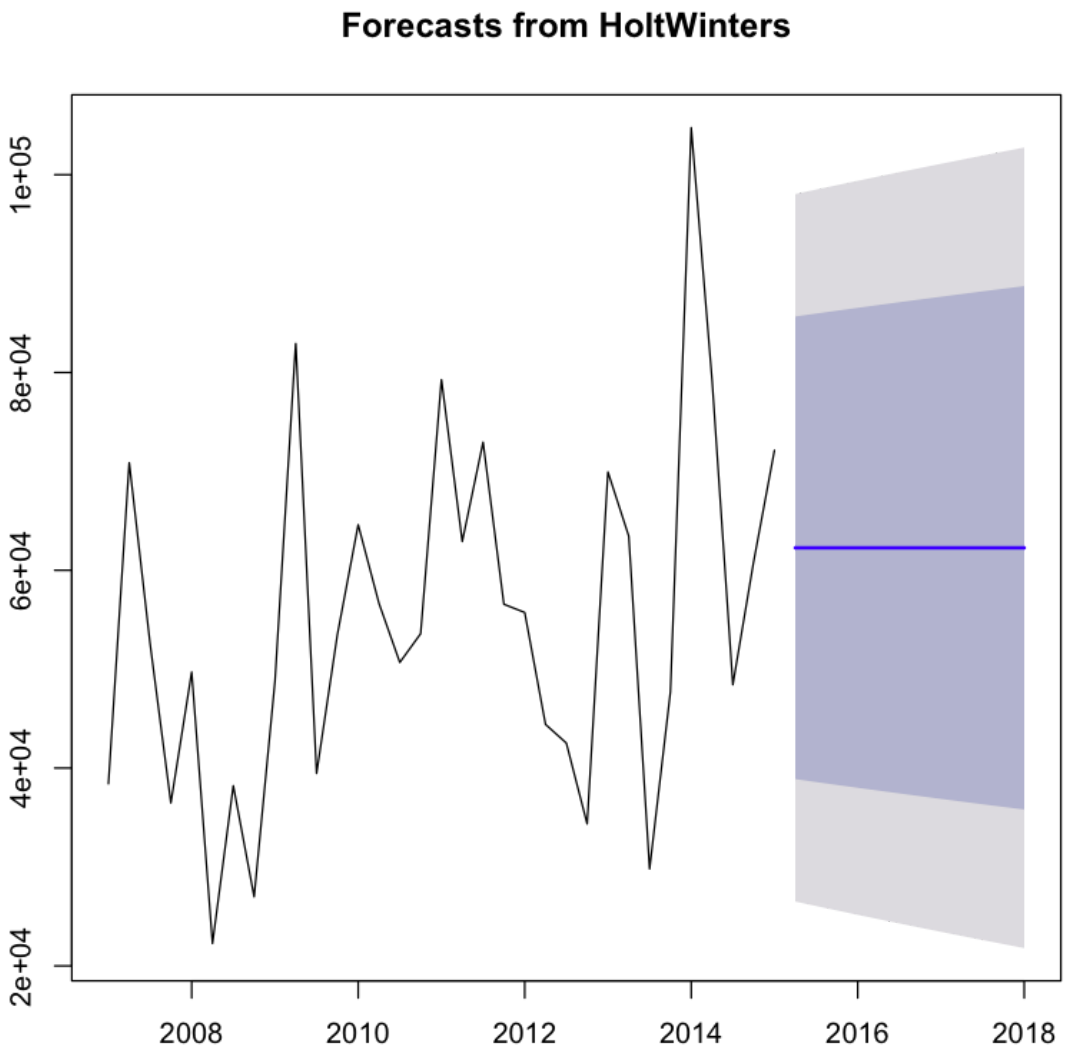
In [24]:
```
TS_year<-ts (Powerdata_year[,3:5], start=c(2006), end=c(2015), frequency = 4)
holt<-HoltWinters(TS_year[,3], beta = FALSE, gamma = FALSE)
plot(holt)
```



Plot SM1 Holt Winter quarterly forecast starting from year 2007

Frequency = 4

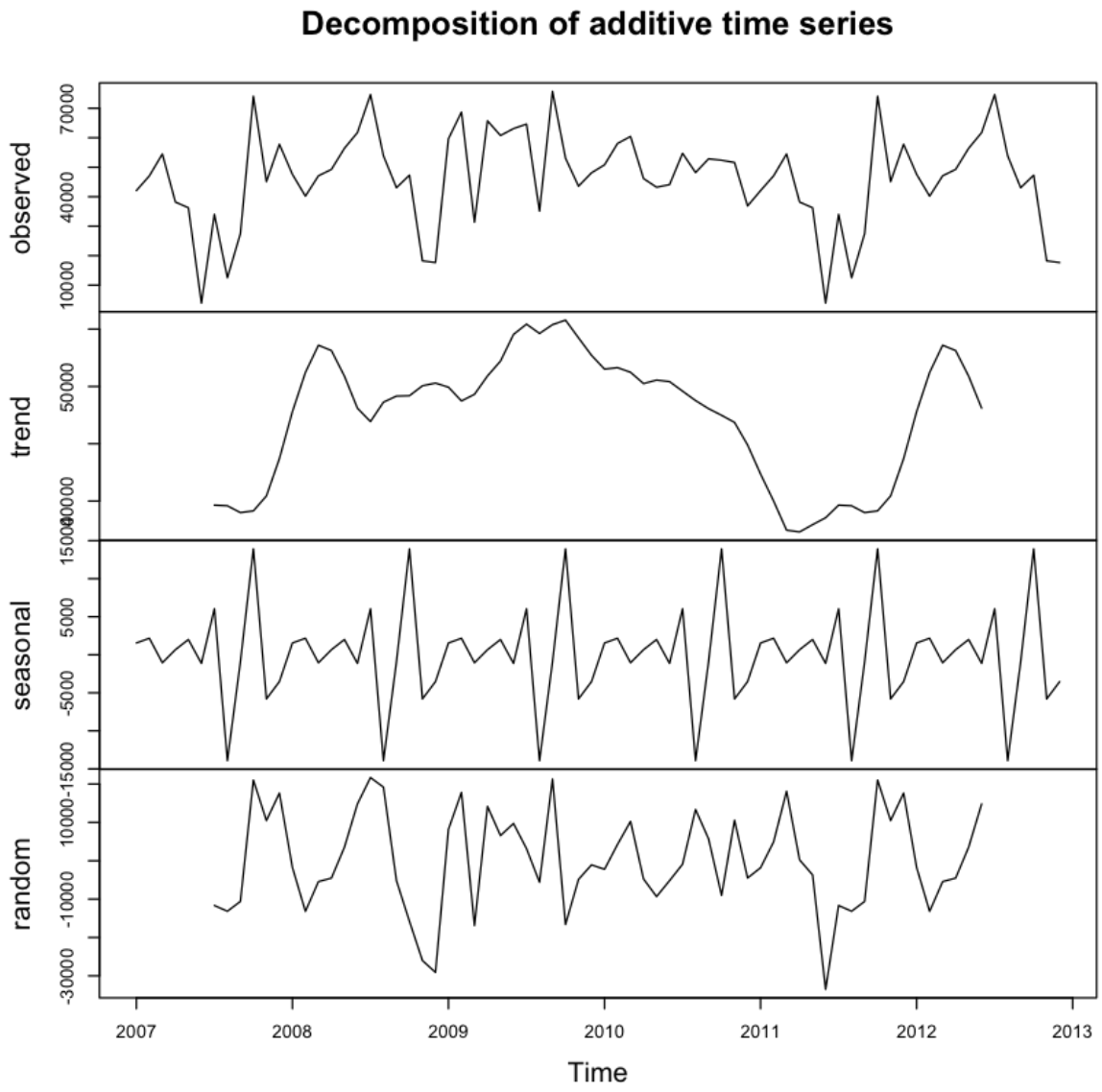
In [26]:
```
plot(
  forecast(
    HoltWinters(
      ts(TS_year[,3], start=c(2007), end=c(2015), frequency=4),
      beta=FALSE, gamma=FALSE
    ),
    h=12
  )
)
```



Decomposition is used to remove seasonal effect from time series. It provides a cleaner

way to understand the trend. Decompose the data for SM1 for years 2007-2012

In [28]:
```
plot(TScomponent)
```



Quarterly trend for SM1, SM2, SM3 from 2007 to 2012

In [30]:
```
par(mfcol=c(3,1))
ts.plot(trend3, plot.type="s", main="SM1 data", gpars= list(col=rainbow(10)))
ts.plot(trend4, plot.type="s", main="SM2 data", gpars= list(col=rainbow(10)))
ts.plot(trend5, plot.type="s", main="SM3 data", gpars= list(col=rainbow(10)))
```

```
Warning message in xy.coords(x = matrix(rep.int(tx, k), ncol = k), y = x, log
= log):
“NAs introduced by coercion”Warning message in xy.coords(x, y):
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x, k), ncol = k), y = x, log = log):
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x, k), ncol = k), y = x, log = log):
“NAs introduced by coercion”Warning message in xy.coords(x, y):
“NAs introduced by coercion”
```
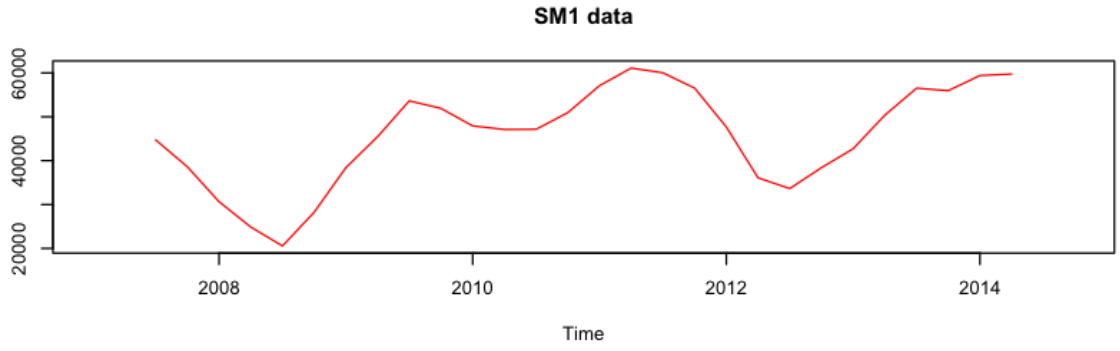
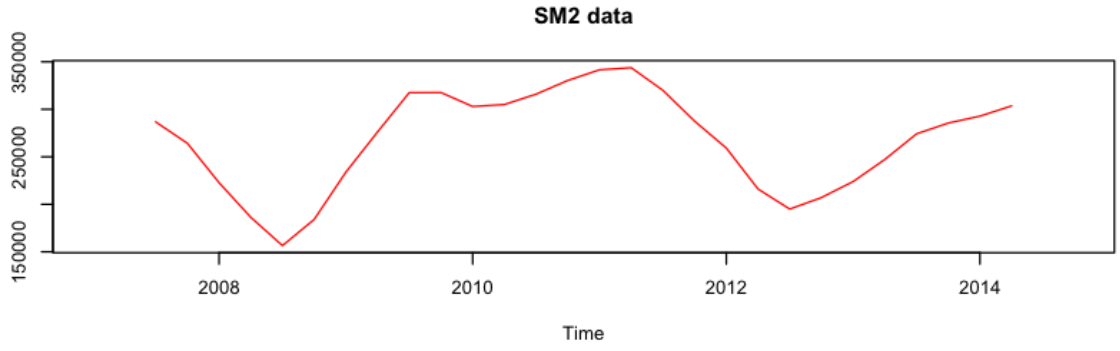
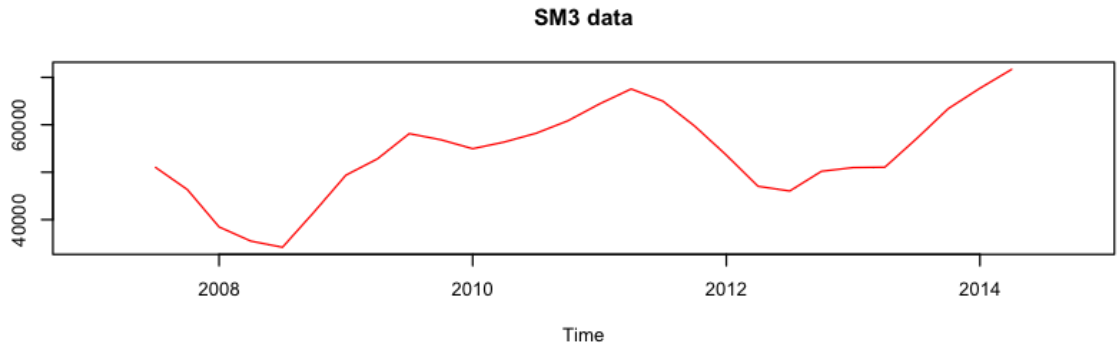
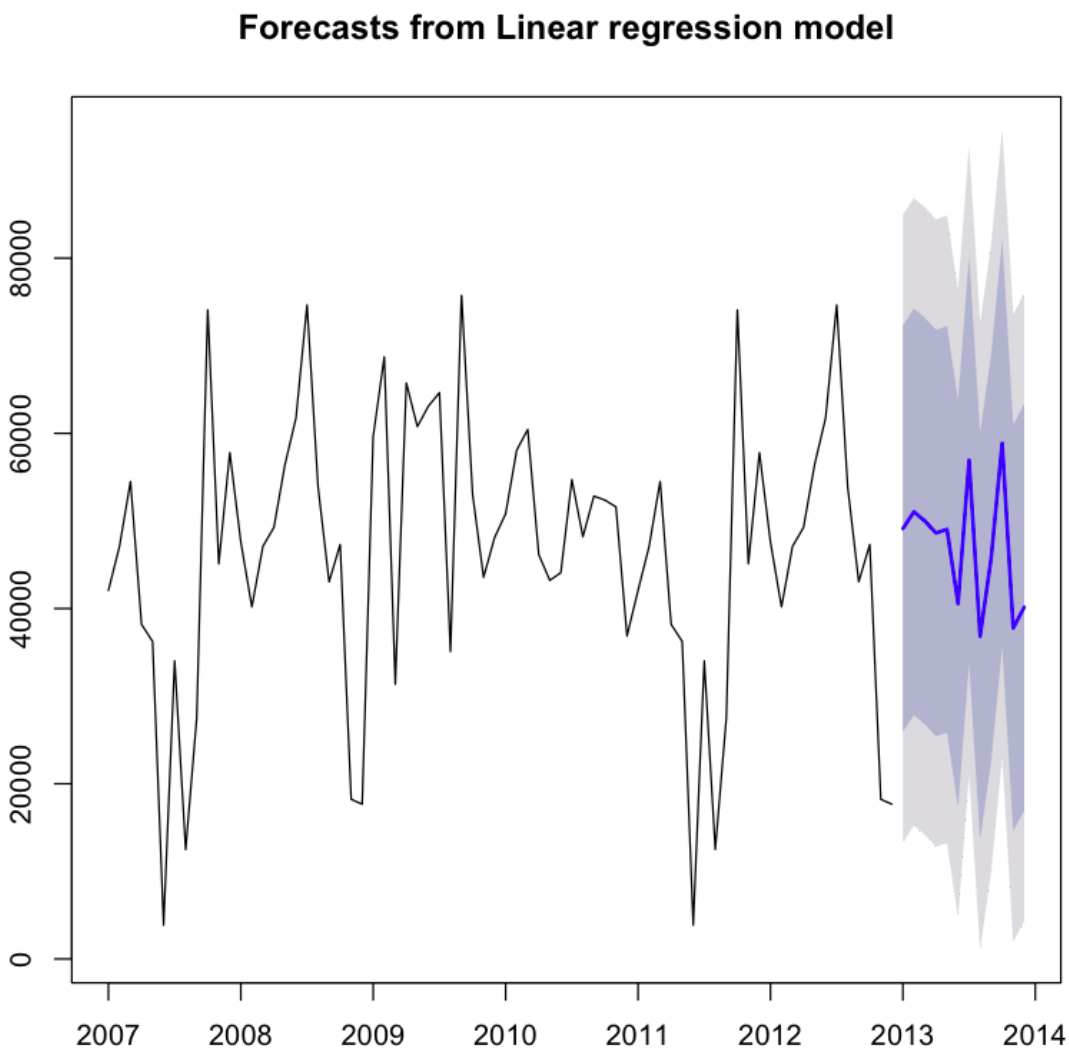







Seasonal SM1 consumption

In [31]:
```
plot(
  forecast(
    tslm(TS_year
         ~ trend + season),
    h=12
  )
)
```



In [32]:
```
ggseasonplot(TS_year, main="Seasonal SM1 consumption")
```